

**Amendment to Claims**

This listing of Claims will replace all prior versions and listings of claims in this Application.

**Listing of Claims**

Claim 1. (ORIGINAL) A method of fabricating a variable resistance device comprising:

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preparing a silicon substrate;

forming a silicon oxide layer on the substrate;

depositing a first metal layer on the silicon oxide, wherein the metal of the first

metal layer is taken from the group of metals consisting of platinum and iridium;

depositing a perovskite metal oxide thin film on the first metal layer;

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depositing a second metal layer on the perovskite metal oxide, wherein the metal of

the second metal layer is taken from the group of metals consisting of platinum and iridium;

annealing the structure at a temperature of between about 400°C to 700°C for

between about five minutes and three hours; and

completing the variable resistance device.

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Claim 2. (ORIGINAL) The method of claim 1 wherein said depositing a perovskite metal

oxide thin film includes depositing multiple layers of a perovskite metal oxide to a thickness of

between about 100 nm to 300 nm, baking the structure between deposition of each layer at a

temperature of between about 100°C to 250°C in an ambient atmosphere and annealing the

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structure at a temperature of between about 400°C to 700°C in an oxygen atmosphere for between

about five minutes and twenty minutes.

Claim 3. (ORIGINAL) The method of claim 2 which includes progressively stepping the

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temperature up from about 100°C to about 250°C, including initially heating the structure to about 120°C for one minute, then heating the structure to about 180°C for about one minute, and then heating the structure to about 240°C for about one minute.

5 Claim 4. (CURRENTLY AMENDED) The method of claim 1 wherein said depositing perovskite metal oxide thin film includes depositing a thin film which has a general formula of  $M'_x M''_{(1-x)} M_z O_z$ , wherein:

M': is taken from the group consisting of La, Ce, Bi, Pr, Nd, Pm, Sm, Y, Sc, Yb, Lu, Gd;

10 M'': is taken from the group consisting of Mg, Ca, Sr, Ba, Pb, Zn, Cd;

M: is taken from the group consisting of Mn, Ce, V, Fe, Co, Nb, Ta, Cr, Mo, W, Zr, Hf, Ni;

x: has a range of between 0 to 1;

y: has a range of between 0 to 2; and

15 z: has a range of between 1 to 7.

Claim 5. (CURRENTLY AMENDED) The method of claim 1 which further includes changing the resistance of the completed device by varying the length of resistance-change-producing pulse pulses.

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Claim 6. (ORIGINAL) The method of claim 5 wherein said changing the resistance of the completed device includes decreasing the resistance of the device by applying a voltage of between about one to three volts between the first metal layer and the second metal layer for a

period of greater than 700 nsec.

Claim 7. (CURRENTLY AMENDED) The method of claim 5 wherein said changing the resistance ~~if of~~ the completed device includes increasing the resistance of the device by applying a voltage of between about two to five volts between the first metal layer and the second metal layer for a period of less than 1000 nsec.

Claim 8. (ORIGINAL) The method of claim 1 wherein said depositing a first metal layer on the silicon oxide, and wherein said depositing a second metal layer on the perovskite metal oxide, includes depositing layers which have a thickness of between about 100 nm and 200nm.

Claim 9. (ORIGINAL) The method of claim 1 wherein said depositing a perovskite metal oxide thin film includes depositing a layer of amorphous perovskite metal oxide thin film.

Claim 10. (CURRENTLY AMENDED) A method of fabricating a variable resistance R-RAM device comprising:

preparing a silicon substrate having a silicon oxide layer on the a surface thereof;

depositing a first metal layer on the silicon oxide, wherein the metal of the first metal layer is taken from the group of metals consisting of platinum and iridium;

depositing a perovskite metal oxide thin film on the first metal layer, including depositing multiple layers of a perovskite metal oxide to a thickness of between about 100 nm to 300 nm, and baking the structure between deposition of each layer at a temperature of between about 100°C to 250°C in an ambient atmosphere and annealing the structure at a temperature of

between about 400°C to 700°C in an oxygen atmosphere for between about five minutes and twenty minutes;

depositing a second metal layer on the perovskite metal oxide, wherein the metal of the second metal layer is taken from the group of metals consisting of platinum and iridium;

5                    annealing the structure at a temperature of between about 400°C to 700°C for between about five minutes and three hours in an oxygen atmosphere; and  
                     completing the variable resistance device.

Claim 11.        (ORIGINAL) The method of claim 10 which includes progressively stepping the  
10                   temperature up from about 100°C to about 250°C, including initially heating the structure to about 120°C for one minute, then heating the structure to about 180°C for about one minute, and then heating the structure to about 240°C for about one minute.

Claim 12.        (CURRENTLY AMENDED) The method of claim 10 wherein said depositing a  
15                   perovskite metal oxide thin film includes depositing a thin film which has a general formula of  $M'_x M''_{(1-x)} M_y O_z$ , wherein:

M':        is taken from the group consisting of La, Ce, Bi, Pr, Nd, Pm, Sm, Y, Sc, Yb, Lu, Gd;

M'':        is taken from the group consisting of Mg, Ca, Sr, Ba, Pb, Zn, Cd;

20            M:        is taken from the group consisting of Mn, Ce, V, Fe, Co, Nb, Ta, Cr, Mo, W, Zr, Hf, Ni;

x:        has a range of between 0 to 1;

y:        has a range of between 0 to 2; and

z: has a range of between 1 to 7.

Claim 13. (CURRENTLY AMENDED) The method of claim 10 which further includes changing the resistance of the completed R-RAM device by varying the length of resistance-  
5 change-producing pulse pulses.

Claim 14. (ORIGINAL) The method of claim 13 wherein said changing the resistance of the completed device includes decreasing the resistance of the device by applying a voltage of  
10 between about one to three volts between the first metal layer and the second metal layer for a period of greater than 700 nsec.

Claim 15. (CURRENTLY AMENDED) The method of claim 13 wherein said changing the resistance if of the completed device includes increasing the resistance of the device by applying a voltage of between about two to five volts between the first metal layer and the second metal layer  
15 for a period of less than 1000 nsec.

Claim 16. (CURRENTLY AMENDED) The method of claim 10 wherein said depositing a first metal layer on the oxide, and wherein said depositing a second metal layer on the perovskite metal oxide, includes depositing layers ~~have~~ having a thickness of between about 100 nm and 200  
20 nm.

Claim 17. (ORIGINAL) The method of claim 10 wherein said depositing a perovskite metal oxide thin film includes depositing a layer of amorphous perovskite metal oxide thin film, and

wherein said baking changes a portion of the amorphous perovskite metal oxide thin film into a crystalline layer.

Claim 18. (CURRENTLY AMENDED) A method of fabricating a variable resistance R-

5 RAM device comprising:

preparing a silicon substrate having a silicon oxide layer on the a surface thereof;

depositing a first metal layer on the silicon oxide, wherein the metal of the first metal layer is taken from the group of metals consisting of platinum and iridium;

depositing a perovskite metal oxide thin film on the first metal layer, including

10 depositing multiple layers of a perovskite metal oxide to a thickness of between about 100 nm to 300 nm, and baking the structure between deposition of each layer at a temperature of between about 100°C to 250°C in an ambient atmosphere, which includes progressively stepping the temperature up from about 100°C to about 250°C, including initially heating the structure to about 120°C for one minute, then heating the structure to about 180°C for about one minute, and then  
15 heating the structure to about 240°C for about one minute, and annealing the structure at a temperature of between about 400°C to 700°C in an oxygen atmosphere, wherein the baking and annealing last for between about five minutes and twenty minutes;

wherein said depositing a perovskite metal oxide thin film includes depositing a layer of amorphous perovskite metal oxide thin film, and wherein said baking changes a portion of  
20 the amorphous perovskite metal oxide thin film into a crystalline layer;

depositing a second metal layer on the perovskite metal oxide, wherein the metal of the second metal layer is taken from the group of metals consisting of platinum and iridium;

annealing the structure at a temperature of between about 400°C to 700°C for

between about five minutes and three hours in an oxygen atmosphere; and  
completing the variable resistance device.

Claim 19. (CURRENTLY AMENDED) The method of claim 18 wherein said depositing a  
5 perovskite metal oxide thin film includes depositing a thin film which has a general formula of  
 $M'_x M''_{(1-x)} M_z O_z$ , wherein:

M': is taken from the group consisting of La, Ce, Bi, Pr, Nd, Pm, Sm, Y, Sc, Yb, Lu,  
Gd;

M'': is taken from the group consisting of Mg, Ca, Sr, Ba, Pb, Zn, Cd;

10 M: is taken from the group consisting of Mn, Ce, V, Fe, Co, Nb, Ta, Cr, Mo, W, Zr, Hf,  
Ni;

x: has a range of between 0 to 1;

y: has a range of between 0 to 2; and

z: has a range of between 1 to 7.

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Claim 20. (CURRENTLY AMENDED) The method of claim 18 which further includes  
changing the resistance of the completed R-RAM device by varying the length of resistance-  
change-producing pulse pulses.

20 Claim 21. (CURRENTLY AMENDED) The method of claim 20 wherein said changing the  
resistance of the completed device includes decreasing the resistance of the device by applying a  
voltage of between about one to three volts between the first metal layer and the second metal  
layer for a period of greater than 700 nsec, and wherein said changing the resistance ~~if~~ of the

completed device includes increasing the resistance of the device by applying a voltage of between about two to five volts between the first metal layer and the second metal layer for a period of less than 1000 nsec.

5      Claim 22.      (CURRENTLY AMENDED) The method of claim 18 wherein said depositing a first metal layer on the oxide, and wherein said depositing a second metal layer on the perovskite metal oxide, includes depositing layers ~~have~~ having a thickness of between about 100 nm and 200 nm.

10      Claim 23.      (CURRENTLY AMENDED) A variable resistance R-RAM device comprising:  
a silicon substrate having a silicon oxide layer thereon;  
a first metal layer formed on the silicon oxide layer, wherein the metal of the first metal layer is taken from the group of metals consisting of platinum and iridium;  
a perovskite metal oxide thin film layer formed on the first metal layer;  
15      a second metal layer formed on the perovskite metal oxide, wherein the metal of the second metal layer is taken from the group of metals consisting of platinum and iridium; and  
metallizing elements ~~to provide a complete device that form the variable resistance R-RAM device.~~

20      Claim 24.      (CURRENTLY AMENDED) The device of claim 23 wherein said a perovskite metal oxide thin film has a general formula of  $M'_x M''_{(1-x)} M_y O_z$ , wherein:

M': is taken from the group consisting of La, Ce, Bi, Pr, Nd, Pm, Sm, Y, Sc, Yb, Lu, Gd;



M": is taken from the group consisting of Mg, Ca, Sr, Ba, Pb, Zn, Cd;

M: is taken from the group consisting of Mn, Ce, V, Fe, Co, Nb, Ta, Cr, Mo, W, Zr, Hf,  
Ni;

x: has a range of between 0 to 1;

5 y: has a range of between 0 to 2; and

z: has a range of between 1 to 7.

Claim 25. (CURRENTLY AMENDED) The device of claim 23 wherein the resistance of the  
R-RAM device is changed by changing by varying the length of resistance-change-producing  
10 pulse pulses applied between the first metal layer and the second metal layer.

Claim 26. (ORIGINAL) The device of claim 25 wherein the resistance of the R-RAM device  
is decreased by applying a voltage of between about one to three volts between the first metal layer  
and the second metal layer for a period of greater than 700 nsec.

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Claim 27. (ORIGINAL) The device of claim 25 wherein the resistance of the R-RAM device  
is increased by applying a voltage of about two to five volts between the first metal layer and the  
second metal layer for a period of less than 1000 nsec.

20 Claim 28. (ORIGINAL) The device of claim 23 wherein said first metal layer and said  
second metal layer have a thickness of between about 100 nm and 200 nm.

Claim 29. (ORIGINAL) The device of claim 23 wherein said perovskite metal oxide thin  
film includes a layer of amorphous perovskite metal oxide thin film.